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(54) A ROTARY SCREEN PRINTING MACHINE

(71) We, STORK BRABANT B.V., a Netherlands limited liability company, of 43A, Wim de Korverstraat, Boxmeer, The Netherlands, do hereby declare the invention,

for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to rotary screen printing machines. Rotary screen printing machines have a paint feeding member which serves to press paint or printing paste through perforations in a stencil in such a manner that the material to be printed receives the desired quantity of paint or printing paste at the intended locations.

A known paint feeding member enabling to attain the aforementioned object consists of a squeegee, e.g. of the type as described in the British Patent Specification No. 1,267,237. According to this Specification a flexible metal blade is used which brushes the inner face of the stencil. It is also possible to use a rod which is pressed mechanically or magnetically against the inner face of the stencil. With all these squeegee types a certain pressure is built up in operation in the paint mass gathering along the convex side of the squeegee. This type of paint feeding member has the drawback that difficulties are experienced in applying the paint uniformly on the full printing width, that is to say the entire length of each stencil. In the aforementioned British Patent Specification 1,267,237 means were already proposed in order to keep the compressive force of the flexible squeegee blade as uniform as possible on the full printing width. For considerable printing widths this gives, however, rise to structural complications so that one has tried to find another solution.

The first proposal is described in Netherlands published Patent Application 73.02664 relating to a paint feeding member which in operation, contacts an area along the inner face of the stencil, while further means are provided for varying the pressure within the member. This structure is the starting point of the present invention, whereby one aims to solve the problem of uniformly feeding the paint on the whole printing width.

According to one aspect of the present invention there is provided a rotary screen printing machine comprising: an elongate paint feeding member arranged to contain a quantity of paint and having a portion which consists of a relatively thin flexible strip with perforations thereon, the strip being substantially part-cylindrical and having a convex face and a concave face, the convex face of the paint feeding member, in operation, being in direct contact with an area of at least one cylindrical stencil which area extends in the longitudinal direction of the paint feeding member; and means for varying the pressure of paint within the paint feeding member.

The perforations in the strip offer a resistance for the paint so that an almost uniform feed pressure can be imparted on the full width to the paint before it contacts the material to be printed. The paint is therefore not supplied by mechanical and hydrodynamic forces (as with a brushing squeegee) to the stencil but due to the increased pressure withing the paint feeding member.

A very uniform feed pressure due to the relative high resistance in the perforations of the strip, may be obtained and when the printing operation is interrupted and the paint feeding member is lifted almost no leakage of the paint will occur. At that moment an increased pressure in the interior of the paint feeding member can be reduced in such a way that no filtering of paint through the perforations will occur.

The supporting means of the paint feeding member can also be simplified since the paint feeding member need only be moved to and fro in one direction and the area of contact will be always at the same location.

Preferably said convex face extends over an angle between substantially 30° and substantially 180°.

The convex face may have a counter-sunk zone, in operation, forming with the stencil a paint chamber.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:—

Figure 1 shows a small part of a rotary screen printing machine according to the present invention;

Figures 2—5 illustrate modifications of a strip shown in Figure 1;

Figure 6 shows another embodiment of a print feeding member of a rotary screen printing machine according to the present invention;

Figure 7 is an inverted plan view of the print feeding member of Figure 6;

Figures 8 and 9 illustrate further embodiments of print feeding members of rotary screen printing machines according to the present invention; and

Figures 10 and 11 relate to a detail of the lateral closure of the paint feeding member.

A rotary screen printing machine according to the present invention is, for example, as described in the Netherlands Patent Specification 134.267. At least one but more usually a plurality of cylindrical stencils 1 are each provided with an internal elongate paint feeding member 2. The material 3 to be printed bears on a supporting belt 4 which in turn bears on a roller 5 positioned under each stencil 1.

Each paint feeding member 2 consists of two chambers 6 and 7 communicating with each other via a plurality of apertures 8 in an intermediate wall 9. The chamber 6 is connected to a conventional source of paint by, for example, a flexible hose and a pump (not shown) drawing the paint from a supply container (not shown) in dependence upon paint consumption.

The chamber 7 is closed by a strip 10 having perforations 11 therein. This strip 10 extends along the entire length of the paint feeding member 2 and is substantially part-cylindrical. The convex face of the strip 10 is, in operation, in contact with the inner face of the stencil 1. In the embodiment of Figure 1 the convex face of the paint feeding member extends over an angle of substantially 30° and in the embodiment of Figure 6 over an angle of substantially 180°.

As shown in Figures 1, 2,4, 5 and 8—11 the strip 10 consists of a relatively thin flexible metal blade. In the modification shown in Figure 2 the convex face has a counter sunk-zone 12 forming a paint chamber 13. In the modification shown in Figure 3 the strip consists of synthetic material and has perforations 11 provided only in a thinner central part 14 forming the paint chamber 13.

In the modification shown in Figure 4 there is provided two opposite U-shaped mounting flanges 15 extending in the longitudinal direction of each paint feeding member 2, whilst longitudinal edges of the strip 10 fit into the flanges. This modification permits easy mounting and dismounting of the strip 10, whereby in operation the strip is firmly pressed into the flanges 15. Figure 5 shows a modification in which each flange 15 engages about a beaded edge of the strip 10.

The paint feeding member comprises further a level feeler 16 (Figure 1). The chamber 7 of which the strip 10 forms a part is connected to a duct 17 leading to a source (not shown) or overpressure or underpressure. The overpressure is used when a desired quantity of paint should be pressed, through the perforations 11 of the strip 10 and through the stencil 1, on to the material 3 to be printed. As sson as this operation is interrupted, the overpressure is relieved and if need be, an underpressure is applied in order to prevent further paint from issuing through the perforations 11. In this way leakage of paint can be avoided.

A rotary screen printing machine according to the present invention and illustrated in Figure 6 corresponds substantially to the combination of Figures 1 and 3. There is, however, an additional intermediate wall 18 in the chamber 7, whilst the perforations 11 have the shape as shown in Figure 7. The pressure of the paint can be controlled in the same way as described in Netherlands published Patent Application 73.02664 by means of a pump and a pressure regulating member.

The modifications shown in Figures 8 and 9 correspond substantially to Figure 1. There are, however, two essential points of difference, viz. that the strip 10 is completely perforated and that two flexible cover lips 19 are disposed against the concave face of this strip, the lips delimiting a narrow area of the strip. The lips 19 are not in contact with the stencil 1 and bear exclusively against the immovably secured, flexible, strip 10. The lips need not absorb the frictional force of the strip which simplified the sealing. The lips 19 have a second function in the arrangement shown in Figure 9 since they constitute a mounting in which, on the one hand, the strip 10 is received and, on the other hand, an engagement with the stationary wall of the chamber 7 of the paint feeding member is attained.

It should be noted that the strip 10 may be manufactured from metal which on its convex face is covered with a synthetic layer showing favourable frictional properties with respect to the inner wall of the stencil 1. The strip 10 may also be covered by a foil glued to the strip, while obviously the perforations of the strip are also provided in this foil or are left clear by the foil.

Figure 10 shows how the end of the strip 10 is closed against the outflow of paint. For that purpose a flexible arched member 20 (Fig. 11) is provided. The member 20 bears by an edge 21 against the concave face of the strip 10 and constitutes a closure which can deform with the strip 10. The connection between the strip 10 and the edge 21 may be a glued joint.

The strip 10 offers a resistance to the flow of the paint and as a consequence allows the creation of an over-pressure so that the possi-

bility of metering is offered while achieving a considerable uniformity in the supply of paint throughout the entire length of the paint feeding member 2.

WHAT WE CLAIM IS:—

1. A rotary screen printing machine comprising: an elongate paint feeding member arranged to contain a quantity of paint and having a portion which consists of a relatively thin flexible strip with perforations therein, the strip being substantially part-cylindrical and having a convex face and a concave face, the convex face of the paint feeding member, in operation, being indirect contact with an area of at least one cylindrical stencil which area extends extend in the longitudinal direction of the paint feeding member; and means for varying the pressure of paint within the paint feeding member.

2. A rotary screen printing machine as claimed in claim 1 in which said convex face extends over an angle between substantially 30° and substantially 180°.

3. A rotary screen printing machine as claimed in claim 1 or 2 in which the convex face has a counter-sunk zone, in operation, forming with the stencil a paint chamber.

4. A rotary screen printing machine as claimed in claim 3 in which the strip is made of synthetic material, the perforations being provided in the counter-sunk zone.

5. A rotary screen printing machine as claimed in any preceding claim in which longitudinal edges of the strip are retained by a pair of opposed U-shaped flanges.

6. A rotary screen printing machine as claimed in claim 5 in which at least one of the longitudinal edges of the strip is secured in the respective flange.

7. A rotary screen printing machine as claimed in any preceding claim in which the feeding member is divided into two compartments one of which is arranged to contain paint and the flexible strip and the other of which is arranged to be connected to a source of overpressure or under pressure.

8. A rotary screen printing machine as claimed in any preceding claim in which the whole strip is perforated, there being two flexible cover lips disposed against a concave face of the strip for delimiting a narrow area of the strip.

9. A rotary screen printing machine substantially as herein described with reference to and as shown in the accompanying drawings.

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1486977 COMPLETE SPECIFICATION
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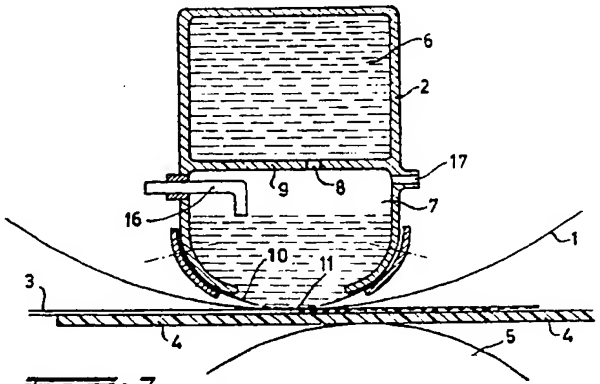


FIG: 1.

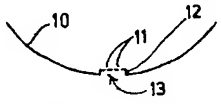


FIG: 2.

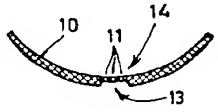


FIG: 3.

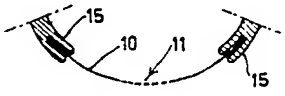


FIG: 4.

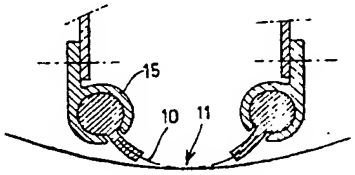
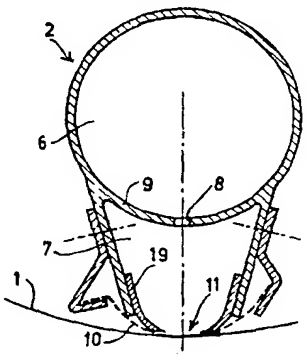


FIG: 5.

FIG. 8.



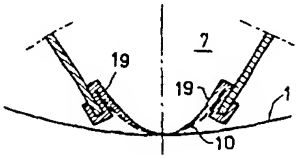


FIG. 9.

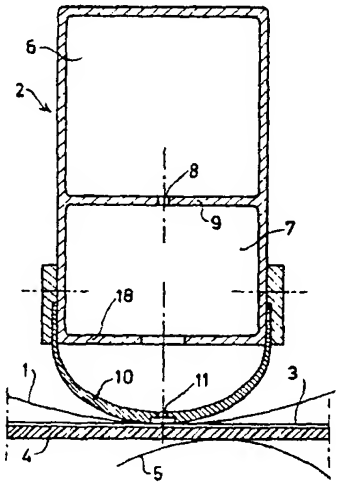


FIG. 6.

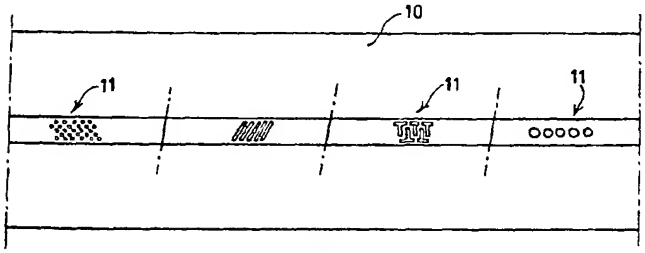


FIG. 7.

1486977 COMPLETE SPECIFICATION
3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 3

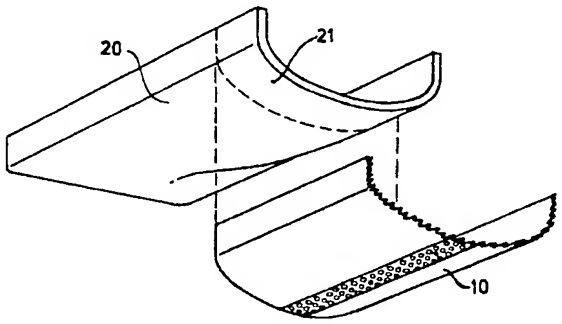


Fig:10.

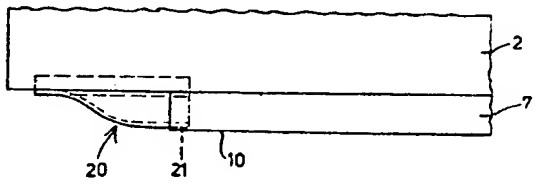


Fig:11.